

REMARKS

Applicant, his principal representatives in Germany, and the undersigned have carefully reviewed the first Office Action of September 9, 2008 in the subject U.S. patent application, together with the prior art cited and relied on in the rejections of the claims. In response, the title, Substitute Specification and claims of the application have been amended. It is believed that the claims which are now pending in the subject application are patentable over the prior art cited and relied on, taken either singly or in combination. Reexamination and reconsideration of the application, and allowance of the claims is respectfully requested.

The subject invention is directed to a surface inspection system that is usable to inspect printed documents such as bank notes, stock certificates and the like. The surface of the material to be inspected is illuminated by an illumination arrangement, depicted generally at 06 in Fig. 2, which produces an illumination pattern 01, as also seen in Fig. 2, as well as in Fig. 1, on the surface 02 of the material 03. A detection device, generally at 08, is provided with a detector 09 that can be a CCD array or a group of photodiodes, for example.

It is important that the surface of the moving material always is illuminated with the same level of light, regardless of the speed at which the surface is moving. The result is a constant brightness which is necessary to allow the detection device to do its job properly. The length of time that the light source is switched on must be coordinated with the length of time that the detection device is also switched on. Clearly, the detection device cannot detect an image if that image is not properly illuminated. Coordination of the times that the illumination apparatus is operative, with

the time that the detection device is operative, is clearly necessary for a proper functioning of the device or optical system. The Examiner is invited to review the discussion at paragraph 016 of the Substitute Specification for a discussion of this interrelationship.

In typical commercial applications, the surface 02 to be inspected is moving at a rate of speed in the range of 3 m/s. The amount of light which is reflected from the moving surface is, as discussed above, changeable as a function of the speed of movement of the surface. The brightness of the picture that is taken also then varies as a function of the speed of the moving material. If the movement speed increases, the light has less time to strike an area in the material, and to be reflected off that area. As a result, the image that is detected by the detection device is not as bright as it otherwise could or should be.

In order to overcome the problem, the length of time that the detection device is switched on is a function of the material speed. As the speed of travel of the material increases, it is necessary that the chronological behavior of the detection device be changed. It is also necessary that the chronological behavior of the light source is also changed. As discussed above, the light source must be on for a certain period of time, which is less than the period of time that the detection device will be on. The various time lines for chronological balance of the detection device 08, the light source 07 and of a constant light source are depicted in Fig. 16.

As is discussed in detail in paragraphs 063, 064 and 066 of the Substitute Specification, the length of the exposure time of the detection device is depicted at t_1 . Sequential exposure times of the detection device are separated by off times t_2 of the

detection device. The light source 07 has a light source switched on time t_3 which is less than the length of exposure time t_1 of the detection device. It is to be understood, as discussed in paragraph 066 of the Substitute Specification, that there is a delay time t_4 between the time when the switch that controls the light source is activated and the time when the light actually is generating light. This is discussed in paragraph 066 of the Substitute Specification. The Examiner is asked to review the discussion.

In the Office Action of September 9, 2008, the title of the application, as set forth on the Substitute Specification, was objected to as not being descriptive of the invention. The title has been amended a second time. It is believed that this second amended title is clearly indicative of the invention to which the claims are directed.

The Supplemental Information Disclosure Statement, which was filed on April 24, 2008, failed to set forth the publication date of the non-patent literature. That date is set forth at the bottom of page 23 of that material as September 2002. The omission of that date from the PTO/SB/08b form is regretted. It is hoped that the Examiner will now consider that material, whose publication date is set forth.

Claim 36 was objected to because of a typographical error. That error has been corrected.

Claim 22 and 38 were rejected under 35 U.S.C. 112, second paragraph as being indefinite. It was asserted that claim 22 is in conflict with claim 21. It was further asserted that the language of claim 38 contradicts the language of claim 21. For the reasons to be set forth below, the undersigned respectfully disagrees.

As is depicted in Fig. 16 of the drawings, and as is discussed in paragraph 066 of the Substitute Specification, there is a delay time between the switching on of the

light source and the start of emission of light from the light source. The delay time is indicated at t_4 in Fig. 16 and the light source switched-on time is indicated at t_3 . Claim 21 recites that both of these times are within the detection device exposure length time t_1 . This is depicted at the left of Fig. 16. Claim 22 recites that the control device is usable to switch the light source on simultaneously with the start of the detection device exposure time. That is also shown at the top left of Fig. 16. The Examiner has not appreciated that the time which the light is switched on is not the same as the light source switched-on time length. The throwing of the switch precedes the emission of light from the light source by the amount of the delay time t_4 . The delay time t_4 is the lag in time between the actuation of the switch and the actual emission of light from the light source. While this delay time t_4 is not a large amount of time, it is a finite amount of time which must be considered. As the surface is moving past the illumination device and the detection device at a variable rate of speed, which is typically greater than 3 m/s, the delay time t_4 is coordinated with the length of exposure time t_1 of the detection device so that the sum of the times t_3 and t_4 will be within the time t_1 . Claim 21 recites that sequence. Claim 22 recites that the start of the switch on of the light source by the control device can be simultaneous with the start of the detection device exposure time. The start of the time t_4 and the start of the time t_1 are the same. The two claims are believed not to be contradictory.

With respect to claim 38, that claim's language has been amended to recite that the at least one light source of the illumination device emits a constant amount of light during the light source switched-on time length. It is believed that claim 38, as amended, is now consistent with the language of claim 21.

Claims 21, 23, 28 and 31 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,175,107 to Juvinal in view of U.S. Patent No. 6,480,280 to Hinata. Claims 21, 25-27, 29, 30 and 35-37 were rejected under 35 U.S.C. 103(a) as being unpatentable over Juvinal in view of U.S. Patent Application Publication No. 2001/0054680 to Lindner. Claim 24 was rejected under 35 U.S.C. 103(a) as being unpatentable over Juvinal in view of U.S. Patent No. 5,591,899 to Griesbeck. Claims 32-34 were rejected under 35 U.S.C. 103(a) as being unpatentable over Juvinal in view of Lindner and further in view of U.S. Patent No. 7, 012,382 to Cheng.

Claim 21, as filed, and even more clearly as amended, is believed to be patentable over the several combinations of prior art patents cited and relied on by the Examiner for the following reasons. The various dependent claims are also believed to be patentable because of their dependence from believed allowable independent claim 21.

In the Juvinal patent, No. 6,175,107, there is depicted a device that is usable to inspect the neck finish of a bottle. It is to be noted initially that there is at least one substantial difference between the basic operation of this prior art device, and the system set forth in claim 21, as filed, and more clearly as amended. In the Juvinal device, as discussed at column 5, lines 19-22, "Successive containers 12 are held stationary (emphasis added) beneath light sources 14, 22 and camera 24 and are rotated by a drive roller 30..." An encoder is coupled to the container rotation mechanism to provide signals indicative of increments of container rotation. Those increments can comprise either fixed angular increments of rotation or fixed time

increments of rotation at a constant velocity. As is further discussed at column 7, lines 11-13, the composite images 62a, 62b and 62c are taken at three increments of container rotation. In other words, in the Juvinal device, the container is stationary when the neck finish is being scanned and examined.

There is no support in Juvinal for various ones of the claimed features attributed to it. While the Examiner appears to have done an excellent job of transposing the language of claim 21 into his discussion of the reference, he has not been able to indicate where, in the reference, support for his claim language importation can be found. For example, the rejection of claim 21 based on the Juvinal reference asserts that Juvinal discloses chronological behavior of the light source as including a light source switched-on time length at the pulse of strobe LED 14 and a light source delay time length immediately preceding the light source switched-on time. There is no support for that assertion in the reference.

Juvinal does not disclose or suggest a specific light source delay time immediately preceding the light source switched-on time. The depiction of Fig. 6 is of a straight horizontal lower line for the strobe LED 14, which indicates that the light is off. A pulse of the strobe LED 14 is indicated by a short, elevated horizontal line. That is the on time of the LED 14. These two horizontal lines are connected by vertical lines. That would indicate that Juvinal has no appreciation of and/or is not concerned about a finite length of time between when the light is switched on and when it actually starts to emit light. With respect to the strobe laser 22, which is pictured at the start of Frame 2, the start of the pulse is coincident with the start of frame 2. Again, there is no discussion or suggestion in this reference of any finite length of time, t_4 in the subject

application, between when the switch is thrown and when the light device begins to emit light. The disclosure of Juvinal does not support the features of claim 21 that the Examiner is trying to attribute to it.

In a similar manner, Juvinal is asserted, in the Office Action, as disclosing a detection device chronological behavior similar to that recited in currently amended claim 21. Again, there is no teaching or suggestion in the reference. Since Juvinal does not teach or suggest any finite amount of a light source delay time length immediately preceding the light source switched-on time length, it is not possible to determine if Juvinal includes those times in the time that the detection device is on; i.e. Frame 1, as depicted in Fig. 6.

As discussed above, Juvinal is silent as to any time delay between the actuation of a switch and the actual emission of light by the light source. Clearly, Juvinal cannot teach a first time sum since it is silent as to any light source delay time length. Claim 21 has been amended to recite that the second time is not a sum. That recitation of claim 21 was not correct. The second time set by the control device, and including the detection device exposure time length, is greater than the first time sum. Juvinal does not disclose, or suggest any first time sum.

The secondary reference to Hinata does not teach or suggest the features of the subject invention, as set forth in currently amended claim 21, which are missing from the Juvinal reference. The Hinata patent is also directed to a device that detects imperfections in the mouth and threads of a glass bottle. Initially, it is again noted that the Hinata reference, as was the case in the Juvinal reference, stops each bottle during the inspection of the bottle. The Examiner's attention is directed to column 6, line 57

where it is recited that the inspection bottle 7 is "...rotated intermittently...". Similarly, column 7, line 18 recites the same language. In both of the references relied on, the bottle is stopped for inspection. There is no discussion of any material support that is usable to support the material to be inspected at a variable transport speed. There is also no disclosure in either of these references of the setting of an off time of the detection device as a function of the variable transport speed.

It is not understood what teaching the Hinata reference adds to the Juvinal reference. Both show the use of several light sources. The addition of the Hinata reference does not supplement the teachings of the Juvinal reference in any meaningful manner.

Claim 21 was also rejected under 35 U.S.C. 103(a) as being unpatentable over Juvinal in view of the U.S. patent application publication No. 2001/0054680 to Lindner. The comments made above, with respect to the Juvinal reference, are believed to also be appropriate to this rejection. It appears that the Examiner has repeated his discussion of the Juvinal reference in his second grounds of rejection. The undersigned will not repeat his discussion of that reference.

The secondary reference to Lindner was cited as depicting a plurality of light sources that are controlled. It is again noted that the Lindner reference is also directed to an inspection device which is usable to optically inspect glass bottles. In this device, there is disclosed a traveling light field which travels at the same speed as the container. The result is that, in a relative manner, there is no movement of the object to be inspected, with respect to the light source that is providing the illumination. In this

reference, the light source intensity and/or the imaging intensity can be varied as a function of the transport position or the rotational position in the inspection area.

It is not contested that Lindner may provide a step of controlling a group of light sources. It is to first be noted that the subject invention, as recited in currently amended claim 21, is directed to an optical system, not to a method of operating an optical system. The fact that Lindner teaches "...controlling a group of a plurality of light sources..." is not overly relevant. As was also noted in the discussion of the Hinata reference, the teaching of a control for a plurality of lights does not appear to add a great deal to the disclosure of the Juvinal reference. Juvinal uses several lights and some type of an informational processor.

At the risk of sounding repetitive, the inventive concept of the present invention is that of keeping the lighting period t_3 , always within the exposure time t_1 , and wherein the length of the lighting period t_3 is less than the exposure period t_1 . Both of the periods t_3 and t_1 are synchronized and are controlled as a function of the transport speed of the surface of the material. This is done by adapting the off period t_2 of the detection device to the variable transport speed. The subject invention also takes into consideration the time delay between the actuation of the light switch and the emission of light by the light source. This light source delay time length t_4 is also kept within the exposure time t_1 . The sum of the lighting period t_3 and of the delay time t_4 is less than the exposure time t_1 . The sum of the times t_3 and t_4 is also within the exposure time t_1 . These are recited in currently amended claim 21 and are not shown, or suggested in the prior art which is cited and relied on in the rejections of that claim.

All of the rest of the claims now pending in the subject application depend, either directly or indirectly, from believed allowable, currently amended claim 21. They are thus also believed to now be allowable. The several other secondary references that were combined with either Juvinal and Hinata or Juvinal and Lindner are not believed to provide the features of currently amended claim 21 that are missing from the Juvinal/Hinata combination or the Juvinal/Lindner combination.

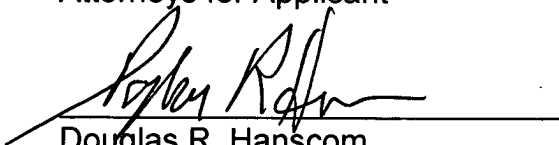
SUMMARY

The title, Substitute Specification and claims of the subject application, as filed, have been amended. The changes to the title and to the Substitute Specification do not constitute any new matter. Claim 21, the sole independent claim now pending in the application, is believed to be patentable over the prior art cited and relied on. All of the rest of the currently pending claims depend from amended claim 21 and are also believed to be patentable. Allowance of the claims, and passage of the application to issue is respectfully requested.

Respectfully submitted,

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